

ENES Data Space Service

Demo/Tutorial

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On behalf of the ENES Data Space team

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What you will learn?



- How to **join** the **ENES Data Space** service
- **Data search, analysis and visualization**
 - How to **search** and **load** CMIP6 datasets through **intake-esm**
 - How to **plot** results through **matplotlib** and **Cartopy**
 - How to exploit **PyOphidia** for **climate data analysis**
 - Basic usage
 - Example of **climate index computation**

ENES Data Space portal

🔒 <https://enesdataspace.vm.fedcloud.eu> ★



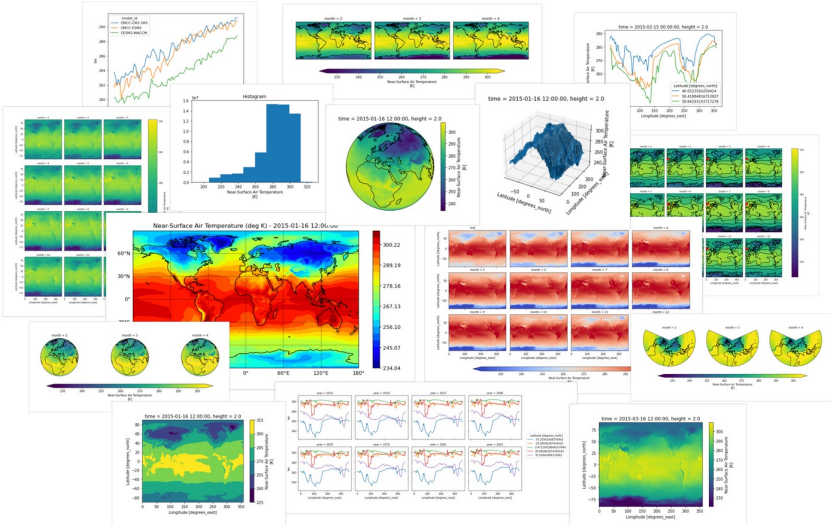
ENES Data Space

Home Notebooks Access

The ENES Data Space delivers an open, scalable and cloud-enabled data science environment for climate data analysis on top of the EOSC Compute Platform. It provides both storage and computational capabilities.

It consists of a JupyterLab instance jointly with a large set of pre-installed Python libraries and a ready-to-use Ophidia HPDA framework instance for running data manipulation, analysis and visualization.

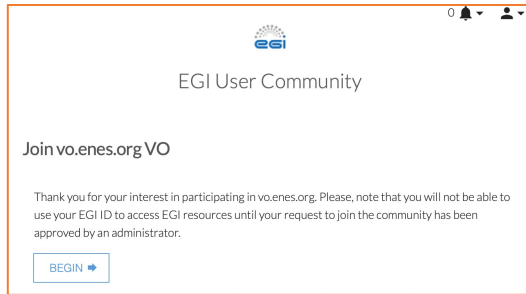
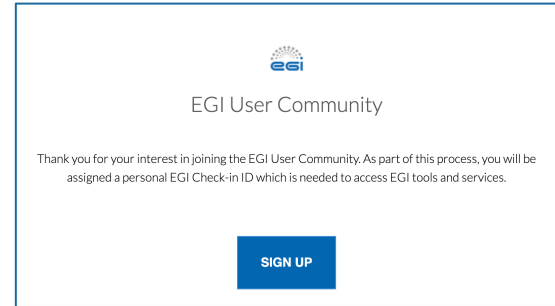
The ENES Data Space hosts (open) data from the ESGF federated data archive on compute cloud to support researchers in realistic climate model analysis experiments.



How to join the service

1. Sign up for an EGI Account

- <https://aai.egi.eu/signup>
- Institutional credentials or any other community IdP
- Personal EGI Check-in ID assigned
- EGI doc: <https://docs.egi.eu/users/aai/check-in/signup/>

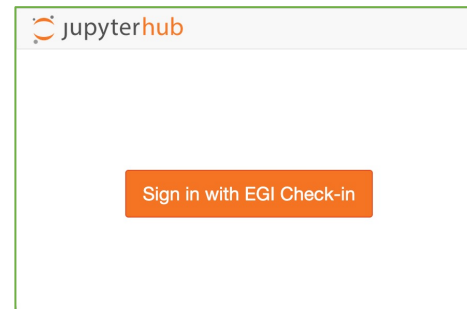


2. Join the vo.enes.org VO

- https://aai.egi.eu/registry/co_petitions/start/coef:231
- Fill in the compilation form and submit the request
- Wait for approval notification

3. Log in to the ENES Data Space service

<https://enesdataspace.vm.fedcloud.eu:4431/jupyter/hub>



Data search, analysis and visualization

1. Quick Start intake-esm

```
Quick_Start_intake-esm.ipynb Python 3 (ipykernel)
Search and Discovery: execute a search query against the catalog
We are interested in:
• CMCC datasets about the CMCC-CM2-SR5 model
• tas variable
• ssp585 experiment

[5]: query = dict( experiment_id="ssp585",
                  source_id="CMCC-CM2-SR5",
                  variable_id="tas"
                )
      cat = col.search(**query)
      cat.df

[5]: index activity_id institution_id source_id experiment_id member_id table_id variable_id grid_label version time_range start_year end_year pa
     0 57950 ScenarioMIP CMCC CMCC-CM2-SR5 ssp585 r11p1f1 Amon tas gn v20200822 201501-210012 201501 210012 /homa/ivy
     /data/CMIP/ScenarioMIP/CMCC/CMCC-CM2-SR5

[6]: cat.keys()

[6]: dict_keys(['ScenarioMIP', 'CMCC', 'CMCC-CM2-SR5', 'ssp585', 'Amon', 'gn'])

Access data
When you are satisfied with the results of your query, you can ask intake-esm to load data assets (NetCDF files) into xarray datasets

[7]: dsset_dict = cat.to_dataset_dict()

--> The keys in the returned dictionary of datasets are constructed as follows:
'activity_id.institution_id.source_id.experiment_id.table_id.grid_label'
100.00% [YI 00:00<00:00]
```

```
Quick_Start_PyOphidia.ipynb Python 3 (ipykernel)
Getting started with PyOphidia

This notebook provides some basic examples of how to use the ophidia framework features for climate data analysis and, in particular, it shows some of the main commands from the PyOphidia module.

PyOphidia is a GPLv3-licensed Python module to interact with the Ophidia framework. It implements two main classes:

• Client class: it supports the submissions of Ophidia commands and workflows as well as the management of sessions from Python code (similar to the Ophidia Terminal)
  • It allows running all the Ophidia operators, including massive tasks and workflows
• Cube class: it builds on the client class and provides the datacube type abstraction and the methods to manipulate, process and get information on cubes objects and
  • It defines an object-oriented approach to handle the datacubes more naturally

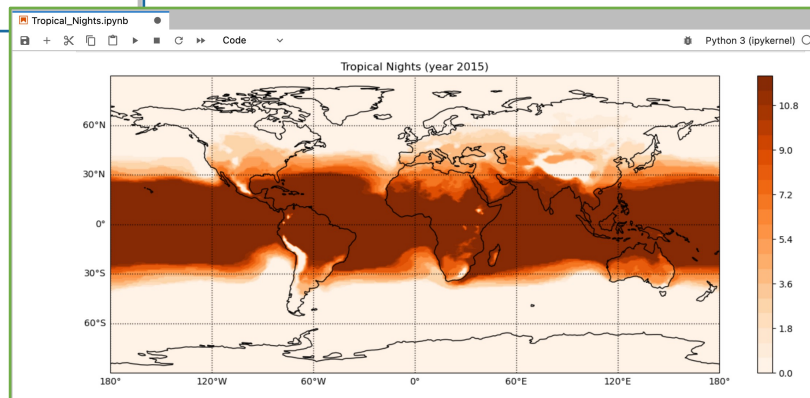
While the cube module provides a user-friendly interface, the client module allows a finer specification of the operators.

First of all import PyOphidia modules

[ ]: from PyOphidia import cube, client
```

2. Quick Start PyOphidia

3. Tropical Nights climate index



Useful links



EGI-ACE: <https://www.egi.eu/projects/egi-ace/>

ENES Data Space: <https://enesdataspace.vm.fedcloud.eu/>

ENES portal: <https://portal.enes.org/>

Ophidia website: <http://ophidia.cmcc.it>

PyOphidia: <https://github.com/OphidiaBigData/PyOphidia>

EGI Check-in: <https://www.egi.eu/services/check-in/>

Contact: enesds-support@cmcc.it



Thank you!

Contact: egi-ace-po@mailman.egi.eu

Website: www.egi.eu/projects/egi-ace



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